



Idaho National Engineering and Environmental Laboratory

A Technology Roadmap for Generation IV Nuclear Energy Systems

***Dr. John M. Ryskamp
INEEL***

IEEE Power Engineering Society Meeting

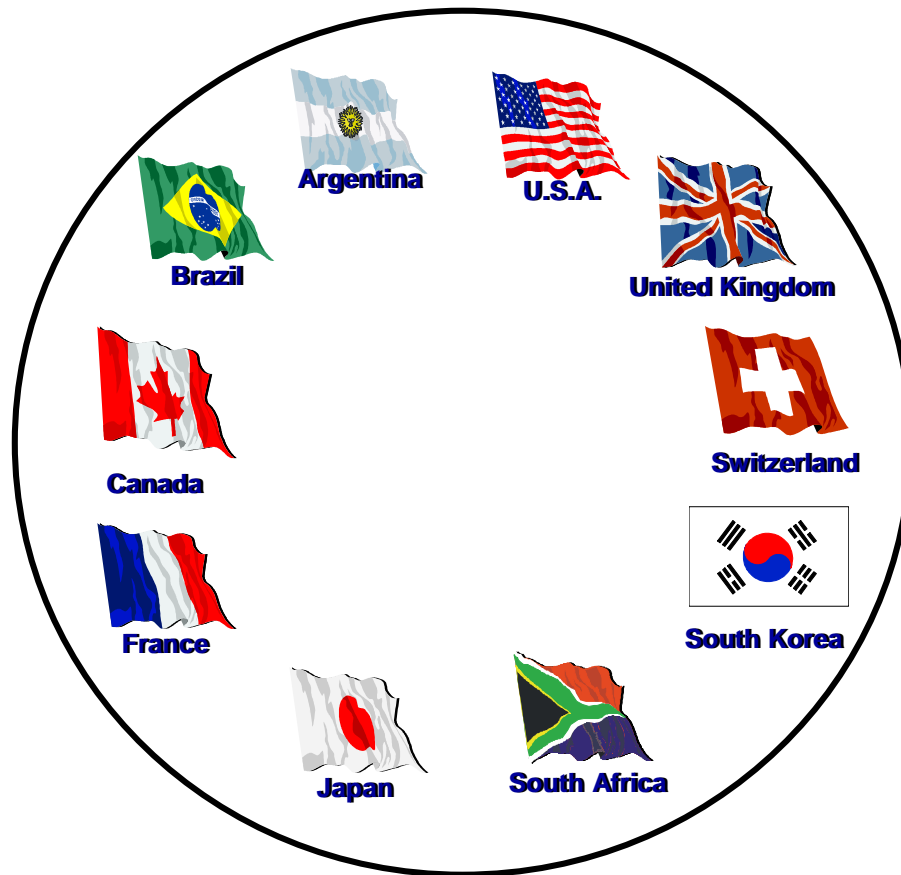
April 28, 2003

Generation IV Technology Roadmap

- ***Identifies systems deployable by 2030 or earlier***
- ***Specifies six systems that offer significant advances towards:***
 - ***Sustainability***
 - ***Economics***
 - ***Safety and reliability***
 - ***Proliferation resistance and physical protection***
- ***Summarizes R&D activities and priorities for the systems***
- ***Lays the foundation for Generation IV R&D program plans***
- ***Available at: <http://gif.inel.gov/roadmap/>***

Generation IV International Forum (GIF)

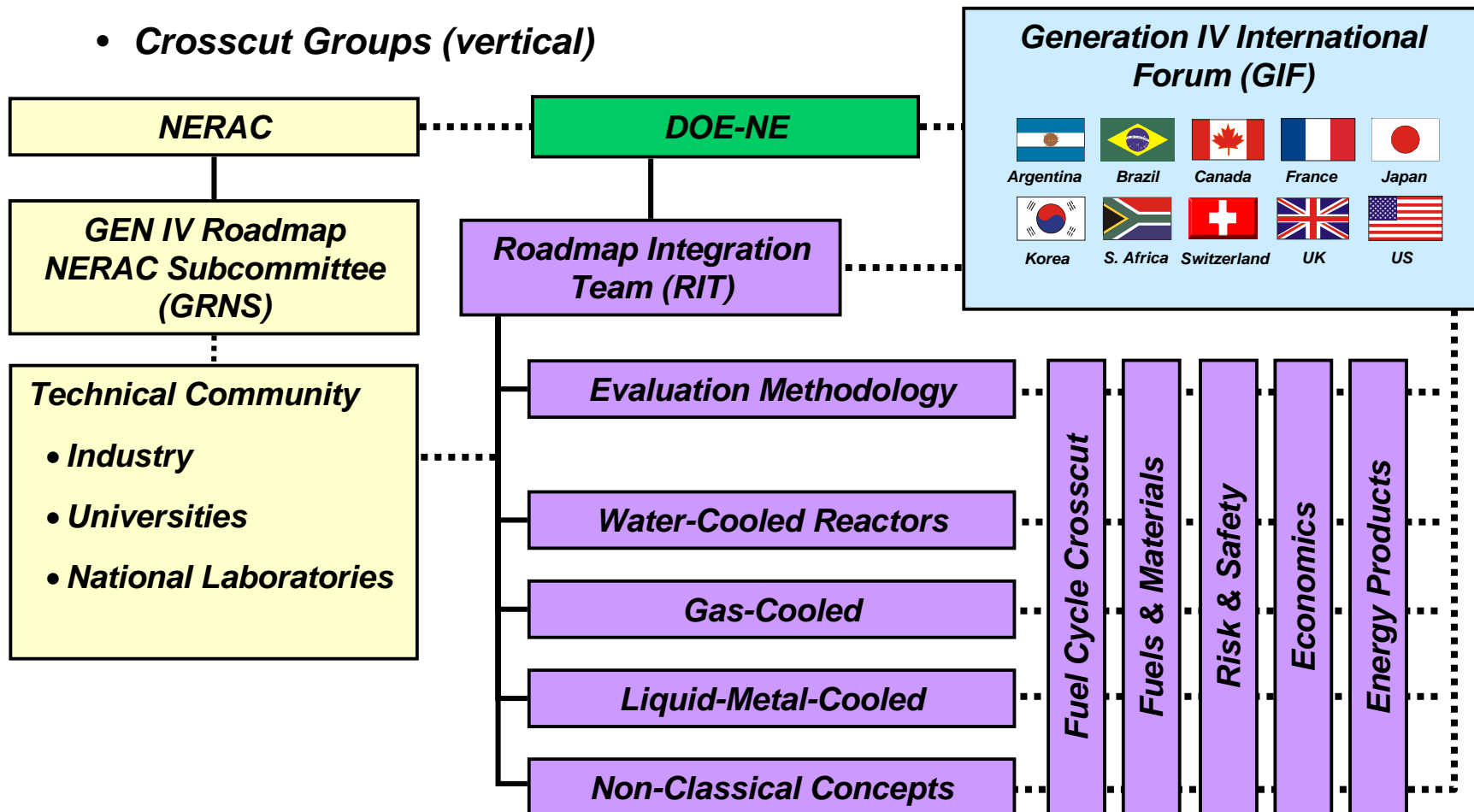
Chartered July, 2001



- **Brings international perspective:**
 - Gen IV Technology Goals
 - Evaluation of Gen IV Systems and R&D
- **Endorses key elements:**
 - **Six Gen IV Systems announced Sep '02**
 - Gen IV Roadmap
- **Collaborates on Generation IV R&D**
- **Observers from:**
 - International Atomic Energy Agency
 - OECD/Nuclear Energy Agency
 - European Commission
 - Nuclear Regulatory Commission
 - Department of State

Organization of Working Groups

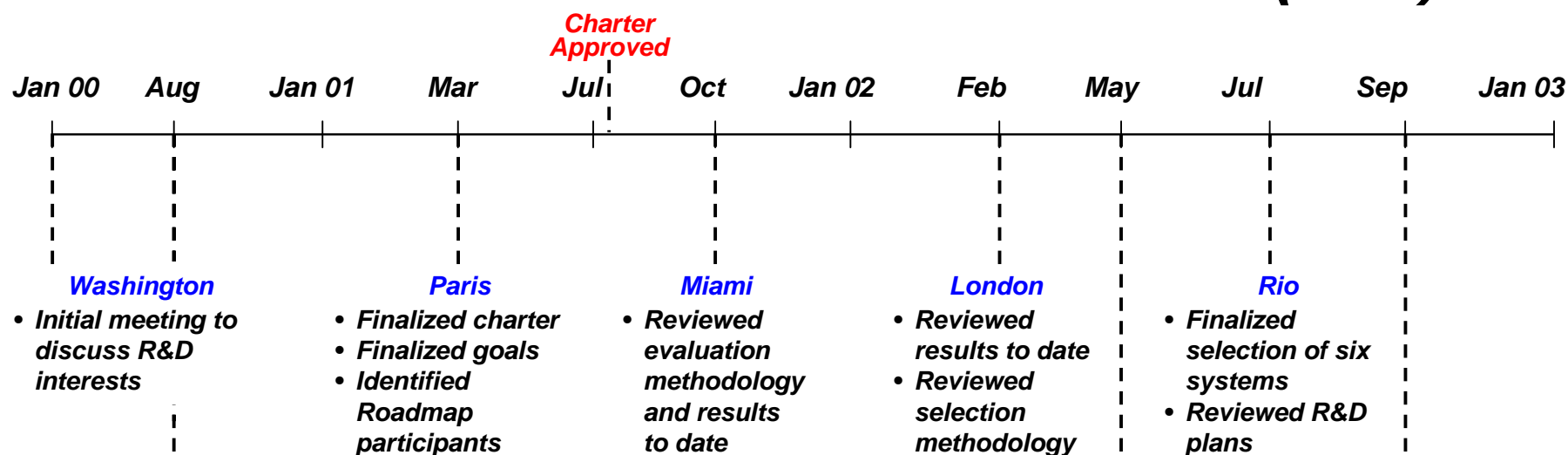
- *Technical Working Groups (horizontal)*
- *Crosscut Groups (vertical)*



The Technical Roadmap Report

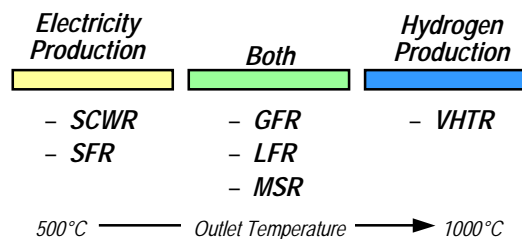
- ***Discusses the benefits, goals and challenges, and the importance of the fuel cycle***
 - ***Describes evaluation and selection process***
 - ***Introduces the six Generation IV systems chosen by the Generation IV International Forum***
 - ***Surveys system-specific R&D needs for all six systems***
 - ***Collects crosscutting R&D needs***
 - ***Recognizes the need for and likelihood of nearer-term deployment, but specifies complete R&D activities***
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- ***GLF countries will choose the systems they will work on***
 - ***Programs and projects will be founded on the R&D surveyed in the roadmap***

Generation IV International Forum (GIF)

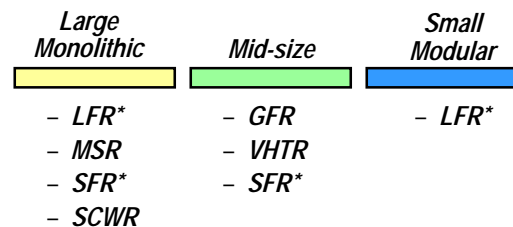


Generation IV System 'Portfolio'

Products

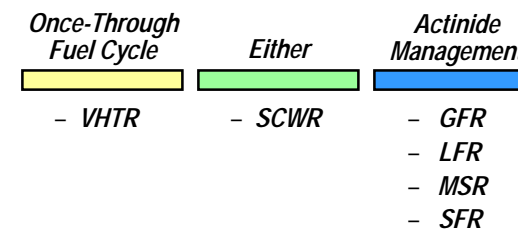


Plant Size



* Range of options

Fuel Cycle



Generation IV R&D Challenges

- ***High temperature, high fluence fuels and materials***
- ***Fuel recycle (separations, refabrication, waste forms)***
- ***Reactor design***
- ***Hydrogen production cycles***
 - ***I-S***
 - ***Ca-Br***
- ***Advanced energy conversion cycles***
 - ***Supercritical CO₂***
 - ***Supercritical water***

Roadmap Summary

- *Six systems were selected, based on evaluations to the Generation IV goals and other considerations*
- *R&D activities were developed and prioritized, with proposed schedules and costs*
- *Viability phase R&D focuses on key decision points to decide feasibility and proof-of-principle*
- *Performance phase R&D focuses on priority issues for the systems to attract demonstration and deployment*
- *The roadmap is a foundation for formulating national and international program plans*